CLAIMS

WE CLAIM:

1. A generator, comprising:

a stator; and

a rotor rotationally mounted at least partially within the stator, the rotor including:

a winding support,

a lamination core mounted on the winding support and having a plurality of slots formed therein,

one or more coils inserted within each of the slots, each coil having at least one end-turn segment protruding from the slot and extending away from the lamination core,

a first inner band located around at least a portion of each of the end-turn segments, the inner band having at least a near end, a distal end disposed opposite the near end, and a thickness, the near end located proximate the lamination core, and the thickness of at least a portion of the first inner band decreasing from at least a point proximate the distal end to at least a point between its distal end and its near end, and

a first outer band located around at least a portion of the first inner band, the first outer band having at least a near end, a distal end disposed opposite the near end, and a thickness, the first outer band near end located proximate the first inner band near end, and the thickness of at least a portion of the first outer band increasing from at least a point proximate its distal end to at least a point between its distal end and its near end.

2. The generator of Claim 1, wherein:

the first inner band comprises a dielectric tape; and

the first outer band comprises a metal.

3. The generator of Claim 1, further comprising:

a dielectric material disposed between at least a portion of each of the coil end-turn segments

4. The generator of Claim 1, wherein the winding support includes:

a lamination support section on which the lamination core is mounted; and

an end-turn support section, the end-turn support section having a support surface positioned proximate the coil end-turn segments and disposed substantially opposite the inner band.

5. The generator of Claim 4, further comprising:

a dielectric material disposed between the end-turn support section support surface and the coil end-turn segments.

6. The generator of Claim 4, wherein:

the lamination core includes a first end and a second end;

each of the lamination slots extends between the lamination core first and second ends;

each coil includes one or more end-turn segments that protrude from one or more of the lamination slots proximate the lamination core first or second end and extend away from the lamination core;

the first inner band is located around the end-turn segments that protrude from the lamination slots proximate the lamination core first end; and

the rotor further comprises:

a coil support coupled to the winding support and disposed substantially opposite the winding support end-turn support section, the coil support having a support surface substantially aligned with the end-turn support section support surface,

a second inner band located around the end-turn segments that extend from lamination slots proximate the lamination core second end, the second inner band having at least a near end, a distal end disposed opposite the near end, and a thickness, the near end located proximate the lamination core, and the thickness of at least a portion of the second inner band decreasing from at least a point proximate the distal end to at least a point between its distal end and its near end, and

a second outer band located around at least a portion of the second inner band, the second outer band having at least a near end, a distal end disposed opposite the near end, and a thickness, the second outer band near end located proximate the second inner band near end, and the thickness of at least a portion of the second outer band increasing from at least a point proximate its distal end to at least a point between its distal end and its near end.

7. The generator of Claim 6, wherein:

the first and second inner bands each comprise a dielectric tape; and

the first and second outer bands each comprise a metal.

8. The generator of Claim 6, further comprising:

a dielectric material disposed between at least a portion of each of the coil end-turn segments.

9. The generator of Claim 1, wherein:

the generator is a brushless AC generator having a main generator assembly and an exciter generator assembly; and

the rotor is part of the main generator assembly.

10. The generator of Claim 1, wherein:

the generator is a brushless AC generator having a main generator assembly and an exciter generator assembly; and

the rotor is part of the exciter generator assembly.

11. A rotor assembly for a generator, comprising:

a winding support;

a lamination core mounted on the winding support and having a plurality of slots formed therein;

one or more coils inserted within each of the slots, each coil having at least one end-turn segment protruding from the slot and extending away from the lamination core;

a first inner band located around at least a portion of each of the end-turn segments, the inner band having at least a near end, a distal end disposed opposite the near end, and a thickness, the near end located proximate the lamination core, and the thickness of at least a portion of the first inner band decreasing from at least a point proximate the distal end to at least a point between its distal end and its near end; and

a first outer band located around at least a portion of the first inner band, the first outer band having at least a near end, a distal end disposed opposite the near end, and a thickness, the first outer band near end located proximate the first inner band near end, and the thickness of at least a portion of the first outer band increasing from at least a point proximate its distal end to at least a point between its distal end and its near end.

12. The rotor of Claim 11, wherein:

the first inner band comprises a dielectric tape; and

the first outer band comprises a metal.

13. The rotor of Claim 1, further comprising:

a dielectric material disposed between at least a portion of each of the coil end-turn segments

14. The rotor of Claim 11, wherein the winding support includes:

a lamination support section on which the lamination core is mounted; and an end-turn support section, the end-turn support section having a support surface positioned proximate the coil end-turn segments and disposed substantially opposite the inner band.

15. The rotor of Claim 14, further comprising:

a dielectric material disposed between the end-turn support section support surface and the coil end-turn segments.

16. The rotor of Claim 14, wherein:

the lamination core includes a first end and a second end;

each of the lamination slots extends between the lamination core first and second ends;

each coil includes one or more end-turn segments that protrude from one or more of the lamination slots proximate the lamination core first or second end and extend away from the lamination core;

the first inner band is located around the end-turn segments that protrude from the lamination slots proximate the lamination core first end; and

the rotor further comprises:

a coil support coupled to the winding support and disposed substantially opposite the winding support end-turn support section, the coil support having a support surface substantially aligned with the end-turn support section support surface,

a second inner band located around the end-turn segments that extend from lamination slots proximate the lamination core second end, the second inner band having at least a near end, a distal end disposed opposite the near end, and a thickness, the near end located proximate the lamination core, and the thickness of at least a portion of the second inner band decreasing from at least a point proximate the distal end to at least a point between its distal end and its near end, and

a second outer band located around at least a portion of the second inner band, the second outer band having at least a near end, a distal end disposed opposite the near end, and a thickness, the second outer band near end located proximate the second inner band near end, and the thickness of at least a portion of the second outer band increasing from at least a point proximate its distal end to at least a point between its distal end and its near end.

17. The rotor of Claim 16, wherein:

the first and second inner bands each comprise a dielectric tape; and

the first and second outer bands each comprise a metal.

18. The rotor of Claim 16, further comprising:

a dielectric material disposed between at least a portion of each of the coil end-turn segments.

19. A method of assembling a rotor, comprising:

providing a winding support;

mounting a lamination core on the winding support;

winding one or more coils on the lamination core;

forming at least one end-turn segment in each coil, each end-turn segment extending away from the lamination core;

disposing a first inner band around at least a portion of each of the end-turn segments, the inner band having at least a near end, a distal end disposed opposite the near end, and a thickness, the near end located proximate the lamination core, and the thickness of at least a portion of the first inner band decreasing from at least a point proximate the distal end to at least a point between its distal end and its near end; and

disposing a first outer band around at least a portion of the first inner band, the first outer band having at least a near end, a distal end disposed opposite the near end, and a thickness, the first outer band near end located proximate the first inner band near end, and the thickness of at least a portion of the first outer band increasing from at least a point proximate its distal end to at least a point between its distal end and its near end.

20. The method of Claim 19, wherein the step of disposing the first inner band comprises the steps of:

wrapping a dielectric material around at least a portion of the end-turn segments, the dielectric material having the inner band near end, the inner band distal end, a thickness, and an outer peripheral surface; and

machining the outer peripheral surface of the dielectric material so at least a portion of the dielectric material thickness decreases from at least a point proximate the distal end to at least a point between its distal end and its near end.

21. The method of Claim 20, wherein the dielectric material is wrapped under tension.

22. The method of Claim 20, wherein:

the dielectric material is wrapped as a wet lay up process using an adhesive; and

the outer peripheral surface is machined after the dielectric material cures.

23. The method of Claim 19, wherein the step of disposing the first outer band comprises the step of:

shrink fitting the outer band over at least a portion of the inner band.

24. In a rotor assembly having at least a winding support and a plurality of coils wound on the winding support, each coil having at least one end-turn segment, a method of making and installing a coil end-turn segment retention assembly on the rotor, the method comprising the steps of:

disposing a first inner band around at least a portion of each of the end-turn segments, the inner band having at least a near end, a distal end disposed opposite the near end, and a thickness, the thickness of at least a portion of the first inner band decreasing from at least a point proximate the distal end to at least a point between its distal end and its near end; and

disposing a first outer band around at least a portion of the first inner band, the first outer band having at least a near end, a distal end disposed opposite the near end, and a thickness, the first outer band near end located proximate the first inner band near end, and the thickness of at least a portion of the first outer band increasing from at least a point proximate its distal end to at least a point between its distal end and its near end.

25. The method of Claim 24, wherein the step of disposing the first inner band comprises the steps of:

wrapping a dielectric material around at least a portion of the end-turn segments, the dielectric material having the inner band near end, the inner band distal end, a thickness, and an outer peripheral surface; and

machining the outer peripheral surface of the dielectric material so at least a portion of the dielectric material thickness decreases from at least a point proximate the distal end to at least a point between its distal end and its near end.

26. The method of Claim 25, wherein the dielectric material is wrapped under tension.

27. The method of Claim 25, wherein:

the dielectric material is wrapped as a wet lay up process using an adhesive; and

the outer peripheral surface is machined after the dielectric material cures.

28. The method of Claim 25, wherein the step of disposing the first outer band comprises the step of:

shrink fitting the outer band over at least a portion of the inner band.